A1 cont'd

of the applied light and requires the device to pass the reflection or transmission light to a photodetector. The loss of light in that case is large. Near-field light in nature possesses an extremely low intensity. It is therefore difficult to employ a magneto-optical recording scheme in an optical memory information reproducing method utilizing near-field light. At the same time, also difficult is its adoption as an optical memory information recording method.

Please replace the paragraph beginning at line 15 of page 7 with the following rewritten paragraph:

A2

An information recording apparatus according to one aspect of the present invention comprises a probe for producing or scattering near field light, probe access means for causing a tip of the probe to access a recording medium probe scanning means for scanning the tip of the probe over the recording medium, and heat radiating means for radiating heat through the tip of the probe, wherein the recording medium is provided on the surface with a thin film that varies in physical properties in response to heating the surface.

Please replace the paragraph beginning at line 19 of page 9 with the following rewritten paragraph:

A3 cont

Also, an information recording apparatus according to another aspect of the invention comprises a probe for

A3 cont

producing or scattering near field light, probe access means for causing a tip of the probe to access a recording medium, probe scanning means for scanning the tip of the probe over the recording medium, heat radiating means for radiating heat through the tip of the probe, and auxiliary heat radiating means to heat up the recording medium, wherein the recording medium is provided on the surface with a thin film that varies in physical properties in response to heating the surface.

Please replace the paragraph beginning at line 5 of page 10 with the following rewritten paragraph:

A4

Accordingly, in addition to heat energy offered from the probe tip, the auxiliary heat radiating means is provided to heat a microscopic region on a recording medium thus enabling information recording more positively and higher in reliability.

Please replace the paragraph beginning at line 10 of page 10 with the following rewritten paragraph:

A5 cont

An information recording apparatus according to another aspect of the invention comprises a probe having a sharpened tip, probe access means for causing the tip of the probe to access a recording medium, probe scanning means for scanning the tip of the probe over the recording medium, and

A5 cont

an illumination light source for illuminating a backside of the recording medium and producing near field light on a surface of the recording medium, wherein the recording medium is provided at the surface with a thin film that varies in physical properties in response to heating the surface.

Please replace the paragraph beginning at line 6 of page 11 with the following rewritten paragraph:

A6

Also, an information recording apparatus according to the invention is characterized in that the illumination light source illuminates the surface of the recording medium and produces near field light on the surface of the recording medium.

Please replace the paragraph beginning at line 11 of page 11 with the following rewritten paragraph:

A7

Accordingly, because near filed light is produced on the surface of a recording medium by illuminating the surface of the recording medium as a recording surface, high density recording of information can be achieved without transmission of illumination light through the recording medium, i.e. even onto an opaque recording medium for illumination light.

Please replace the paragraph beginning at line 18 of page 11 with the following rewritten paragraph:

A8

A method of recording information according to one aspect of the invention comprises a probe access process of causing a tip of a probe for producing or scattering near field light to access a recording medium, a probe scanning process of scanning the tip of the probe to a desired position on the recording medium, and a heat recording process of radiating heat energy through the tip of the probe for locally heating up the recording medium and recording information on the recording medium.

Please replace the paragraph beginning at line 10 of page 12 with the following rewritten paragraph:

A9

Accordingly, in addition to the heat energy offered through the probe tip, the auxiliary heating process is provided for further heating the region where the heat energy is applied. Thus, heating is possible more positively in a sufficient size, enabling high density recording of information with reliability.

Please replace the paragraph beginning at line 16 of page 12 with the following rewritten paragraph:

A10 cont

Furthermore, a method of recording information according to another aspect of the invention comprises an

A10 cont'd

illumination process of illuminating the surface of a recording medium and producing near field light on the recording medium, a probe access process of causing a sharpened tip of a probe to access the recording medium and recording information on the recording medium by locally intensified energy caused due to insertion of the tip of the probe in a region of the near field light, and a probe scanning process of scanning the tip of the probe to a desired position on the recording medium.

Please replace the paragraph beginning at line 12 of page 13 with the following rewritten paragraph:

A11

Furthermore, a method of recording information according to the invention is characterized in that the illumination process is performed to illuminate a backside of the recording medium and produce near field light on the recording medium.

Please replace the paragraph beginning at line 22 of page 15 with the following rewritten paragraph:

A12

Hereunder, embodiments of information recording apparatuses according to the present invention will be explained in detail based on the attached drawings.

Please replace the paragraph beginning at line 24 of page 18 with the following rewritten paragraph:

A3

Incidentally, the above explanation used, as a recording probe, the optical probe having the microscopic aperture is used. Alternatively, this may be replaced by a conventional micro-cantilever used in an AFM so that the laser light given off by the heater light source 4 is applied to the micro-cantilever to heat up the micro-cantilever itself thereby providing the heat energy radiated at a tip of the micro-cantilever to the recording medium 3. The tip of the micro-cantilever is generally finer than a diameter of the microscopic aperture possessed by the above optical probe, through which heat energy is radiated and localized to nearly a tip size. It is therefore possible to record information with high density surpassing a recording density of the conventional optical memory recording apparatus.

Please replace the paragraph beginning at line 20 of page 20 with the following rewritten paragraph:

A14

Furthermore, the micro-cantilever itself may be formed as a heater element so that the heater element 13 and the heat conductive layer 14 may be eliminated.

Please replace the paragraph beginning at line 4 of page 21 with the following rewritten paragraph:

A15

In Fig. 7, an optical fiber probe 21 is adopted as a recording probe having, at a tip thereof, a not-shown microscopic aperture to which light given off by a heater light source 4, preferably coherent laser light, is introduced through a condensing optical system 6. The microscopic aperture of the optical fiber probe 21 herein has a diameter sufficiently smaller than a wavelength of laser light to be introduced, e.g. in a size of nearly several tens nano-meters. Furthermore, the optical fiber probe 21 is in an L form directed toward the surface of a recording medium 3. Because the handling ability of this probe is like that of a conventional AFM cantilever, it is convenient to utilize the AFM technology.

Please replace the paragraph beginning at line 17 of page 21 with the following rewritten paragraph:

A14 cont

The microscopic aperture of the optical fiber probe 21 when introduced with laser light causes near-field light at its microscopic aperture part. Also, the optical fiber probe 21 is caused to access the recording medium such that the surface of the recording medium 3 is included in a near-field light region at the microscopic aperture part by the

A14 cont

conventional AFM technology, that is, the probe displacement detector mechanism 7 and the feedback mechanism 9.

Please replace the paragraph beginning at line 15 of page 25 with the following rewritten paragraph:

A17

Accordingly, light, preferably coherent laser light, is locally applied, at a backside of the recording medium 3, to a point at which the microscopic aperture of the optical fiber probe 21 is located. This assists in heating up the phase change film area where the microscopic aperture is located. In Fig. 7, the laser light from an assist light source 22 is applied through an optical system formed by a mirror 23 and condensing optical system 24 to the backside of the recording medium 3, thereby giving assistance in locally heating-up the recording medium 3.

Please replace the paragraph beginning at line 25 of page 22 with the following rewritten paragraph:

A18 cont

This complements the probe 21 and overcomes the insufficiency in thermal energy needed for elevating the phase change film to the phase shift temperature encountered where providing only heat energy due to the near-field light produced at the microscopic aperture of the probe 21. Thus, high density of information recording is achieved on the phase

A18 Cont'd

change film formed on the recording medium 3. Incidentally, it is preferred to making the amount of heating by near-field light, or the intensity of laser light for causing near-field light, to as small as possible with respect to the amount of heating by the assist light source, or the intensity of laser light at the assist light source. This makes it possible to reduce the intensity of laser light to be introduced to the optical fiber probe 21, preventing the microscopic aperture part from being deformed or damaged due to laser-light heating. Furthermore, because the optical system for the assist light source is arranged on a back side of the recording medium, the recording medium in its surface is to be effectively utilized.

Please replace the paragraph beginning at line 21 of page 24 with the following rewritten paragraph:

A19

Incidentally, in Embodiments 1 and 2 described above, the information recorded on the recording medium can be reproduced, for example, by a near-field light detection technology for the near-field microscope, i.e. a method that near-field light localized on a recording medium is scattered into scattered light to be detected intensity change or phase change.

Please replace the paragraph beginning at line 7 of page 25 with the following rewritten paragraph:

A20

In Fig. 10, a recording probe 26 has a sharpened tip, e.g. a micro-cantilever for use in AFM or a probe used in an STM (Scanning Tunnel Microscope). In particular, a metal probe is preferred. Meanwhile, a recording medium 3 is formed, for example, with a phase change film for use in a phase change scheme as was explained in Embodiment 1.

Please replace the paragraph beginning at line 20 of page 25 with the following rewritten paragraph:

A21 cont

The recording probe 26 at its tip is inserted in a region of near-field light localized on the surface of the recording medium 3 and caused to access a desired point on the recording medium 3. This causes the near-field light 29 to scatter at the tip of the recording probe 26, producing scattered light (propagation light). This propagation light has energy having an intensity distribution greater in a vicinity of the tip of the recording probe 26. Due to this, an intensified energy region 30 is caused to overlap with the energy given off by the localized near-field light 29 in a desired point on the recording medium 3 accessed by the tip of the recording probe 26. The intensified energy region 30 provides the phase change film with heating reaching a phase

A21 cont'd

shift temperature in a desired point on the recording medium 3 as could not be attained by the energy of only a near-field light. Thus, high density information recording is made possible on the recording medium 3.

Please replace the paragraph beginning at line 15 of page 26 with the following rewritten paragraph:

A 22 cont'd

To reproduce the information recorded by the intensified energy region 30, laser light 28 comparatively weak in intensity is applied to the backside of the recording medium 3 such that the intensified energy region 30 in the information recording as mentioned above has an intensity such that the phase change film is not raised to the phase shift temperature. The laser light 28 comparatively weak in intensity produces near-field light 29 having similarly comparatively weak intensity. The recording probe 26 at the tip is inserted in a region of the produced near-field light 29 to scatter the near-field light 29, thereby obtaining scattered light (propagation light) 31. The obtained propagation light 31 is guided to not-shown photodetector by the focusing optical system 27. Accordingly, a recording state of information is determined in a point on the recording medium 3 accessed by the tip of the recording probe, from an intensity or phase of the propagation light 31. Thus, the